LOREX
VIEW YOUR WORLD™

WIRELESS DIGITAL SECURITY CAMERA

INSTRUCTION MANUAL

ENGLISH VERSION 1.0

VANTAGE

LW2220

www.lorextechnology.com

Thank you for purchasing this product.

This manual refers to the following models:

- LW2220

To learn more about this product and to learn about our complete range of accessory products, please visit our website at:

www.lorextechnology.com

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RICK OF ELECTRIC SHOCK DO NOT REMOVE COVER. NO USER SERVICABLE PARTS INSIDE.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the products ' enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

CAUTION: TO PREVENT ELECTRIC SHOCK, MATCH WIDE BLADE OF THE PLUG TO THE WIDE SLOT AND FULLY INSERT.

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Need Help?

CONTACT US FIRST

DO NOT RETURN THIS PRODUCT TO THE STORE

Please make sure to register your product at www.lorextechnology.com to receive product updates and information

3 Easy Ways to Contact Us:

Online:

Product Support is available 24/7 including product information, user manuals, quick start up guides and FAQ's at
www.lorextechnology.com/support
To order accessories, visit
www.lorextechnology.com

By Email:

Technical Support (for technical/installation issues)
support@lorexcorp.com
Customer Care (for warranty and accessory sales)
customerservice@lorexcorp.com
Customer Feedback
info@lorexcorp.com

By Phone:

North America:
Customer Service: **1-888-425-6739** (1-888-42-LOREX)
Tech Support: **1-877-755-6739** (1-877-75-LOREX)
Mexico: **1-800-514-6739**
International: **+800-425-6739-0**
(Example: From the UK, dial 00 instead of +)

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COMUNÍQUESE PRIMERO CON NOSOTROS

Vous Avez Besoin D'aide?

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NO DEVUELVA ESTE PRODUCTO A LA TIENDA

Cerciórese de por favor colocar su producto en www.lorexcctv.com/registration para recibir actualizaciones y la información del producto

3 MANERAS SENCILLAS DE COMUNICARSE CON NOSOTROS:

En línea:

apoyo al producto disponible 24/7 incluyendo información del producto, manuales para el usuario, guías de inicio rápido y preguntas más frecuentes en
www.lorextechnology.com/support

Para colocar pedidos de accesorios, visite
www.lorextechnology.com

Por Correo Electrónico:

soporte técnico (para asuntos técnicos/la instalación)
support@lorexcorp.com

O

servicio al cliente (respecto a la garantía y a la venta de accesorios)
customerservice@lorexcorp.com

Comentarios de cliente
info@lorexcorp.com

Por Teléfono:

Norte América:
Atención al cliente: **1-888-425-6739** (1-888-42-LOREX)
Soporte técnico: **1-877-755-6739** (1-877-75-LOREX)
Mexico: **1-800-514-6739**
Internacional: **+800-425-6739-0**
(Ejemplo: Desde el Reino Unido, marque el 00 en lugar del +)

NE RETOURNEZ PAS CE PRODUIT AU MAGASIN

Veuillez veiller à enregistrer votre produit à www.lorex-cctv.com/registration pour recevoir des mises à jour et l'information de produit

3 FAÇONS FACILES DE NOUS CONTACTER:

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le support des produits est disponible 24 heures sur 24, 7 jours sur 7, y compris les informations sur les produits, les guides de l'utilisateur, les guides de démarrage rapide et les foires à questions
www.lorextechnology.com/support
Pour commander des accessoires, visitez
www.lorextechnology.com

Par Courriel:

support technique (pour les questions techniques et 'installation) **support@lorexcorp.com**

OU

service à la clientèle (pour les questions de garantie et les ventes d'accessoires)
customerservice@lorexcorp.com

Commentaires des clients
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Par Téléphone:

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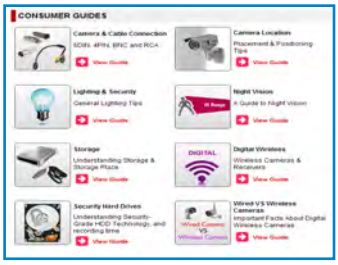
Service à la clientèle: **1-888-425-6739** (1-888-42-LOREX)
Support technique: **1-877-755-6739** (1-877-75-LOREX)
Mexico: **1-800-514-6739**
International: **+800-425-6739-0**
(Exemple: À partir du Royaume-Uni, composez 00 au lieu de +)

BEFORE YOU START

THIS PRODUCT MAY REQUIRE PROFESSIONAL INSTALLATION

LOREX IS COMMITTED TO FULFILLING YOUR SECURITY NEEDS

- We have developed user friendly products and documentation. Please read the Quick Start Guide and User Manual before you install this product.



- Consumer Guides and Video Tutorials are available on our web site at **www.lorextechnology.com/support**

- If you require further installation assistance, please visit **www.lorextechnology.com/installation** or contact a professional installer.

- Please refer to the "Need Help" insert for technical support and customer care information.

- Please note that once the components of this product have been unsealed, you cannot return this product directly to the store without the original packaging.

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AVANT DE COMMENCER

CE PRODUIT POURRAIT EXIGER UNE INSTALLATION PROFESSIONNELLE

LOREX S'ENGAGE À SATISFAIRE VOS BESOINS SÉCURITAIRES

- Veuillez lire le guide de démarrage rapide et le mode d'emploi avant d'installer ce produit

- Les guides du consommateur et les séances de tutorat vidéo sont disponibles sur l'Internet en visitant www.lorextechnology.com/support

- Si vous avez besoin de l'aide pour l'installation, veuillez visiter www.lorextechnology.com/installation ou contactez un spécialiste en installation

- Veuillez référer à l'insert "Need Help" pour ob¬tenir de l'information sur le service à la clientèle et le support technique

- Veuillez constater qu'une fois que les com¬posantes de ce produit ont été retirées de l'emballage, vous ne pourrez plus retourner ce produit directement au magasi

ANTES DE EMPEZAR

ESTE PRODUCTO PUEDE EXIGIR UNA INSTALACIÓN PROFESIONAL

LOREX SE COMPROMETE A SATISFACER SUS NECESIDADES EN SEGURIDAD

- Favor de leer la guía de instalación rápida y la guía del usuario antes de instalar este product.

- Puede conseguir las guías del consumidor y los cursos en enseñanza video sobre el Internet visitando www.lorexcctv.com/support

- Si necesita ayuda para la instalación, visite www.lorextechnology.com/installation o contacte un especialista en instalaciones

- Favor de referir al documento "Need Help" para obtener información acerca del servicio al cliente y al soporte técnico

- Favor de notar que una vez que los componentes de este producto han sido removidos del embalaje, no podrá devolver este producto directamente a la tienda

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May 5 2011 - R5

Important Safeguards

In addition to the careful attention devoted to quality standards in the manufacture process of your product, safety is a major factor in the design of every instrument. However, safety is your responsibility too. This sheet lists important information that will help to ensure your enjoyment and proper use of the product and accessory equipment. Please read them carefully before operating and using your product.

General Precautions

1. All warnings and instructions in this manual should be followed.
2. Do not use receivers or video monitors in humid or wet places.
3. Keep enough space around the product for ventilation. Slots and openings in the storage cabinet should not be blocked.
4. It is highly recommended to connect the product to a surge protector to protect from damage caused by electrical surges. It is also recommended to connect the product to an uninterruptible power supply (UPS), which has an internal battery that will keep the product running in the event of a power outage.
5. Remove the plug from the outlet before cleaning. Do not use liquid aerosol detergents. Use a water dampened cloth for cleaning.

Installation

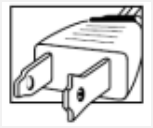
1. **Read and Follow Instructions** - All the safety and operating instructions should be read before the product is operated. Follow all operating instructions.

2. **Retain Instructions** - The safety and operating instructions should be retained for future reference.

3. **Heed Warnings** - Comply with all warnings on the product and in the operating instructions.

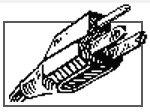
4. **Polarization** - Do not defeat the safety purpose of the polarized or grounding-type plug.

   A polarized plug has two blades with one wider than the other.

   A grounding type plug has two blades and a third grounding prong.

   The wide blade or the third prong are provided for your safety.

   If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

5. **Power Sources** - This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your location, consult your video dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.

6. **Overloading** - Do not overload wall outlets or extension cords as this can result in the risk of fire or electric shock. Overloaded AC outlets, extension cords, frayed power cords, damaged or cracked wire insulation, and broken plugs are dangerous. They may result in a shock or fire hazard. Periodically examine the cord, and if its appearance indicates damage or deteriorated insulation, have it replaced by your service technician.

7. **Power-Cord Protection** - Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.

8. **Surge Protectors** - It is highly recommended that the video equipment be connected to a surge protector. Doing so will protect the equipment from damage caused by power surges. Surge protectors should bear the UL listing mark or CSA certification mark.

9. **Uninterruptible Power Supplies (UPS)** - Because this product is designed for continuous, 24/7 operation, it is recommended that you connect the product to an uninterruptible power supply. An uninterruptible power supply has an internal battery that will keep the product running in the event of a power outage. Uninterruptible power supplies should bear the UL listing mark or CSA certification mark.

   Caution: Maintain electrical safety. Power line operated equipment or accessories connected to this product should bear the UL listing mark or CSA certification mark on the accessory itself and should not be modified so as to defeat the safety features. This will help avoid any potential hazard from electrical shock or fire. If in doubt, contact qualified service personnel.

Installation (Continued)

10. **Ventilation** - Slots and openings in the case are provided for ventilation to ensure reliable operation of the product and to protect it from overheating. These openings must not be blocked or covered. The openings should never be blocked by placing the video equipment on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided and the product manufacturer's instructions have been followed.

11. **Attachments** - Do not use attachments unless recommended by the product manufacturer as they may cause a hazard.

12. **Water and Moisture** - Do not use receivers or video monitors near water — for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, near a swimming pool and the like.

13. **Heat** - The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

14. **Accessories** - Do not place this video equipment on an unstable cart, stand, tripod, or table. The video equipment may fall, causing serious damage to the product. Use this product only with a cart, stand, tripod, bracket, or table recommended by the manufacturer or sold with the product. Any mounting of the product should follow the manufacturer's instructions and use a mounting accessory recommended by the manufacturer.

15. **Camera Extension Cables** – Check the rating of your extension cable(s) to verify compliance with your local authority regulations prior to installation.

16. **Mounting** - The cameras provided with this system should be mounted only as instructed in this guide or the instructions that came with your cameras, using the provided mounting brackets.

17. **Camera Installation**- Cameras are not intended for submersion in water. Not all cameras can be installed outdoors. Check your camera environmental rating to confirm if they can be installed outdoors. When installing cameras outdoors, installation in a sheltered area is required.

Service

1. **Servicing** - Do not attempt to service this video equipment yourself, as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

2. **Conditions Requiring Service** - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

   A. When the power supply cord or plug is damaged.

   B. If liquid has been spilled or objects have fallen into the product.

   C. If the product has been exposed to rain or water.

   D. If the product has been dropped or the cabinet has been damaged.

   E. If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.

   F. When the product exhibits a distinct change in performance. This indicates a need for service.

7. **Replacement Parts** - When replacement parts are required, have the service technician verify that the replacements used have the same safety characteristics as the original parts. Use of replacements specified by the product manufacturer can prevent fire, electric shock, or other hazards.

8. **Safety Check** - Upon completion of any service or repairs to this product, ask the service technician to perform safety checks recommended by the manufacturer to determine that the product is in safe operating condition.

Use

1. **Cleaning** - Unplug the product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

2. **Product and Cart Combination** - Product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.

3. **Object and Liquid Entry** - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or "short-out" parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

4. **Lightning** - For added protection of this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power line surges.

⚠ WARNING

STRANGULATION HAZARD:

Infants have STRANGLED in power cords. Keep power cords more than 3 feet away from cribs, bassinets, play yards and other safe sleep environments for infants.

NOTICES

FCC Notice:

This equipment has been certified and found to comply with the limits regulated by the FCC part 15, subpart C. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception (which can be determined by turning the equipment on and off), the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio or television technician for assistance

Warning:

To ensure compliance with the FCC's RF exposure guidelines, this equipment should be installed and operated with minimum distance 20cm (7.87in) between the radiator and nearby persons.

Industry Canada Notice:

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1)This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesirable operation.

This Class B digital apparatus complies with Canadian ICES-003.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

MODIFICATION:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the device.

Toute modification non approuvée explicitement par le fournisseur de licence de l'appareil peut entraîner l'annulation du droit de l'utilsateur à utiliser l'appareil.

RoHS:

This product is fully compliant with the European Union Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment ("RoHS") Directive (2002/95/EC). The RoHS directive prohibits the sale of electronic equipment containing certain hazardous substances such as lead, cadmium, mercury, and hexavalent chromium, PBB, and PBDE in the European Union.

It is imperative that the user follows the guidelines in this manual to avoid improper usage which may result in damage to the product, electrical shock, and fire hazard injury. In order to improve the features, functions, and quality of this product, the specifications are subject to change without notice from time to time.

Features

- Real time (25 frames per second) wireless video.
- Adaptive FHSS digital wireless technology minimizes conflicts with competing wireless signals.
- Simple installation. No video cable required[1].
- Connect multiple receivers to your surveillance recorder (DVR) to create a wireless surveillance solution[2].
- Up to 165ft (50m) indoor / 500ft (152m) outdoor wireless range[3].
- SMA connectors for range extension accessories.

Camera Features

- Night vision range up to 90ft (27m) / 135ft (41m)[4].
- Weatherproof housing ideal for indoor or outdoor use (IP66)[5].
- Built in microphone for listen-in audio.
- Built-in auto-mechanical infrared camera filter achieves accurate color reproduction in varying lighting conditions.

Receiver Features

- High gain antenna ensures improved long distance operation.
- Plugs directly into a TV or DVR (BNC adapter included) with 4ft termination cable for flexible installation.
- Safety warning feature notifies you when the camera is out of range.
- Convenient signal strength indicator.

1. Camera requires a wired connection to a power outlet. Power adapter included.
2. Using multiple receivers in close proximity to each other may cause a slight slowdown in frame rate performance. Try to maintain at least a few inches of space between each receiver.
3. Maximum wireless transmission range. Actual range dependent upon building materials and other obstructions in path of wireless signal.
4. Stated IR illumination ranges are based on ideal conditions in total darkness and in typical outdoor night time ambient lighting. Actual range and image clarity depends on installation location, viewing area, and light reflection / absorption level of object.
5. Not intended for submersion in water. Installation in a sheltered area recommended.

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1. Getting Started

The system comes with the following components:

1 X WIRELESS CAMERA (WITH SUNSHADE)*

1 X CAMERA MOUNTING STAND*

1 X WIRELESS RECEIVER*

1 X MOUNTING KIT*

(Mounting kit contents may differ from image)

2 X POWER ADAPTERS* (FOR CAMERA & RECEIVER)

1 X RCA/BNC ADAPTER*

2 X WIRELESS ANTENNA* (FOR CAMERA & RECEIVER)

INSTRUCTION MANUAL
QUICK START GUIDE

*Number of cameras and receivers may vary by model.

CHECK YOUR PACKAGE TO CONFIRM THAT YOU HAVE RECEIVED THE COMPLETE SYSTEM, INCLUDING ALL COMPONENTS SHOWN ABOVE.

2. Wireless Receiver

2.1 Front

1 **Removable Wireless Antenna (SMA):** Connects to antenna jack at the back of receiver.

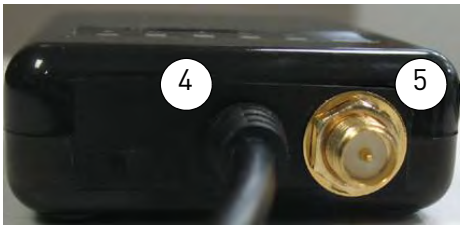
2 **Front LED**: Glows green to indicate receiver is powered on.

3 **Pairing Button:** For details, see "Pairing Cameras" on page 7.

2.2 Rear

4 **Termination Cable**: Contains AC Power, RCA video (yellow), and RCA audio (white) connectors.

5 **Antenna Jack**: Connect the wireless antenna here.



3. Wireless Camera

1 **Removable Wireless Antenna (SMA)**: Connects to antenna jack at the back of camera.

2 **Camera Stand**

3 **Pairing Button**: For details, see “Pairing Cameras” on page 7.

4 **Antenna Jack**: Connect the wireless antenna here.

5 **AC Power Cable**

Attention - This camera includes an Auto Mechanical IR Cut Filter. When the camera changes between Day/Night viewing modes, an audible clicking noise may be heard from the camera. This clicking is normal and indicates that the camera filter is working.

4. Installing The Camera

- Before you install the camera, carefully plan where and how it will be positioned and where you will route the cable that connects the camera to the power adapter.
- Before starting permanent installation, verify the camera's performance by observing the image on a monitor when camera is positioned in the same location / position where it will be permanently installed.

4.1 Installation Warnings

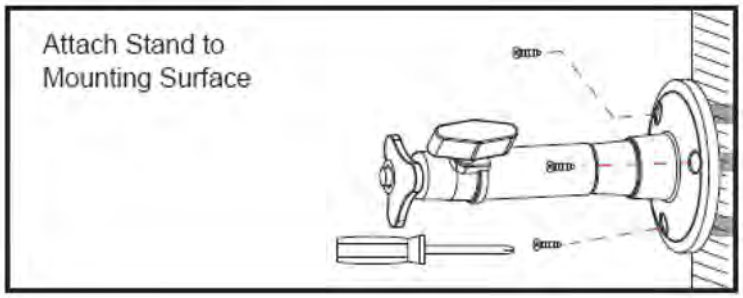
- Aim the camera(s) to best optimize the viewing area: select a location for the camera that provides a clear view of the area you want to monitor, that is free from dust, and that is not in line-of-sight to a strong light source or direct sunlight.
- Avoid installing the camera where there are thick walls or obstructions between the camera and the receiver.
- Avoid installing in a location which requires the wireless signal to pass through cement, concrete, and metal structures. This will reduce the range of transmission. For details, see "Appendix C: Facts About Digital Wireless Cameras" on page 10.
- Select a location for the camera that has an ambient temperature between 14°F~122°F (-10°C~50°C)
- Not intended for submersion in water. For outdoor use, installation in a sheltered location is recommended.

4.2 To Install the Camera

1 Screw the antenna to the back of the camera.

2 Use the included mounting screws to mount the stand to the mounting surface:

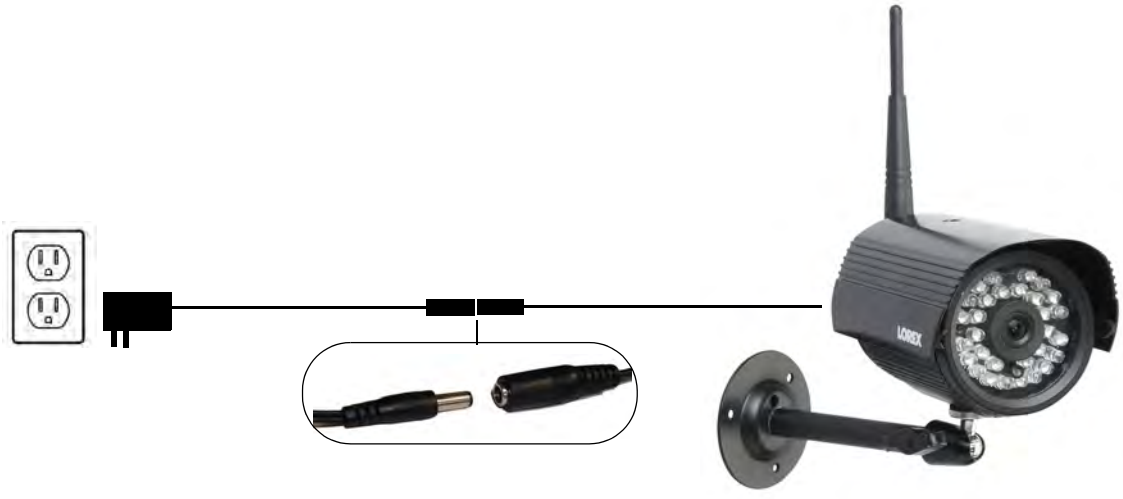
- Mark the position of the screw holes on the wall.
- Drill holes and insert the drywall plugs (included) as needed.
- Firmly attach the stand to the wall using the provided screws.



3 Screw the camera onto the head of the stand **(1)**.

Adjust the angle of the camera until the desired view is set. Tighten the thumbscrew to secure the camera position **(2)**.

4 Connect the power cable from the camera to the power adapter. Plug the power adapter into a power outlet or surge protector.



5. Installing the Wireless Receiver

Before powering on the receiver, make sure to first connect and power on the camera. This will ensure a proper connection.

1 Screw the wireless antenna to the back of the receiver.

2 Connect the yellow video cable and white audio cable (mono) to your TV, DVR, or observation system.

- Use the RCA/BNC adapter (included) to connect the video cable to a BNC port.

3 Connect the power cable to the power adapter. Plug the power adapter into a power outlet or surge protector.

4 Place the receiver in a place that will have clear reception to your camera[1].

5.1 On-Screen Display

1 **Signal Indicator**: The signal indicator shows the strength of the signal being received from the camera. The number of bars in the signal indicator shows the strength of the signal. One or no bars indicates the signal is poor. Four bars indicate a very strong signal.

2 **Status Indicator**: The status indicator message "No Signal" appears when the receiver is trying to locate a camera.

ATTENTION: If the signal is low (e.g. 1 or 2 bars) adjust the antennas or reposition the camera or receiver to improve signal strength.

1. Avoid installing in a location which requires the wireless signal to pass through cement, concrete, and metal structures. This will reduce the range of transmission.

6. Pairing Cameras

IMPORTANT

The camera and receiver have already been pre-paired at the factory, which means that they are exclusively communicating with each other. If for some reason the pairing is lost, follow these steps to pair up the camera and receiver.

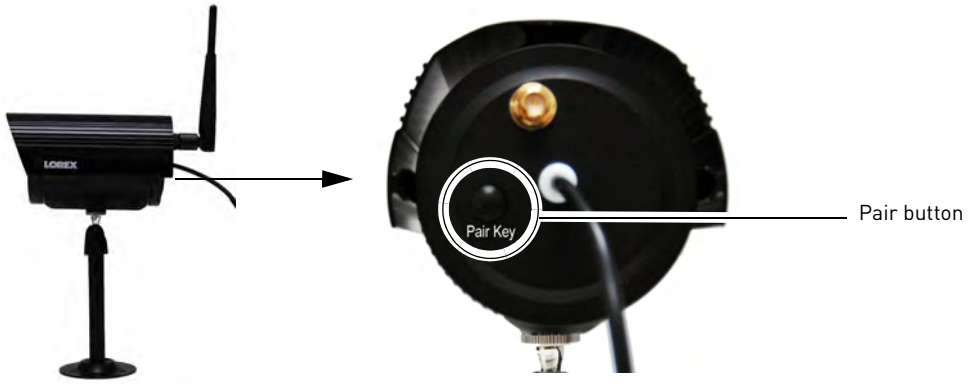
To pair the camera to the receiver:

1 Make sure that the camera and receiver are both powered up.

2 On the receiver, press and hold the **Pairing** button for 5 seconds to activate pairing function.

- The on-screen displays informs you that you have 30 seconds to press the pair button on the camera.

3 Press the **Pair** button on the back of the camera. You must press the Pair button on the camera within 30 seconds of pressing the Pair button on the Wireless Receiver. If pairing is successful, live video from the camera will immediately appear on the monitor.



7. Appendix A: System Specifications

7.1 Receiver Specifications

Receiving Frequency Range	2.400GHz~2.480GHz
RX Sensitivity	-81dBm
Demodulation	GFSK
Data Rate	160 Kb/s
Supported Resolution	VGA (640 x 480) up to 25 Frames per Second
Termination	RCA Video, RCA Audio
Power Requirement	12V DC +/- 10%
Power Consumption	110mA Max
Operating Temperature Range	14°F ~ 122°F / -10°C ~ 50°C

7.2 Camera Specifications

Transmitting Frequency Range	2.400GHz~2.480GHz
TX Power	16dBm
TX Range	165ft (50m) indoor / 500ft (152m) outdoor[1]
Data Rate	160 Kb/s
Modulation	GFSK
Image Sensor Type	1/4" Color CMOS Image Sensor
Effective Pixels	H: 640 V: 480
Image Compression	MPEG4
Image Resolution	VGA (640x480)
Lens	3.6mm F2.0
Field of View (Diagonal)	63°
AGC	On
AES	1/60 ~ 1/62,500 Sec.
Power Requirement	12V DC +/- 10%
Power Consumption	400mA Max with IR LED 170mA Max without IR LED
Operating Temperature Range	14°F ~ 122°F / -10°C ~ 50°C
Environment Rating[2]	IP66
IR LED Quantity / Type	30 pieces / 850nm
Night Vision Range[3]	90ft (27m) / 135ft (41m)
Built in Auto IR Turn On / Off	CdS Drive Auto IR LED turn On/Off Circuit

1. Maximum wireless transmission range. Actual range dependent upon building materials and other obstructions in path of wireless signal.
2. Not intended for submersion in water. Installation in a sheltered area recommended.
3. Stated IR illumination ranges are based on ideal conditions in total darkness and in typical outdoor night time ambient lighting. Actual range and image clarity depends on installation location, viewing area, and light reflection / absorption level of object.

8. Appendix B: About Digital Wireless Technology

The Digital Wireless signal transmission type used by Lorex digital wireless cameras is also known as **FHSS—Frequency Hopping Spread Spectrum**.

The 2.4GHz (2.400-2.480GHz) band is divided into sections or paths of 2MHz per section, and each second, the transmission signal hops hundreds of times in a specified sequence within this frequency range. The overall bandwidth required for frequency hopping is much wider than 2MHz; however, because transmission occurs only on a small section of this bandwidth at any given time, the signal being transmitted does not suffer from greatly reduced signal degradation and also avoids paths blocked by other devices that act as sources of competing signals. The strength of the signal being transmitted is set to be from 13.5-16dBm, which is much higher than the analog transmission signal allowed by authorities around the globe.

When an image is captured by the camera, it is instantly converted from an analog to a digital signal and is packaged into small packets. With each successful transmission via the 2MHz paths discussed above, the packets of information containing images are delivered to the receiver and decoded into analog information. The information can then be displayed on devices that are connected to the wireless receiver (RX).

A device pairing process is required to synchronize the transmitter (TX, Camera) and the receiver (RX). This allows the transmitter and receiver to be on the same frequency and use the same algorithm for frequency hopping. This ensures that only the paired transmitter and receiver can maintain communication signal by hopping to the same frequency paths at the exact same time. As a result, the chance that other devices within the same frequency range are on the same frequency, at the same time and in the same order is vastly reduced. Note that the pairing process is already done at the factory for products that ship within the same packaging.

9. Appendix C: Facts About Digital Wireless Cameras

9.1 Wired vs. Wireless Cameras

A **wired camera** has a video cable that transmits the video signal from the camera to a recording or viewing device.

A **wireless camera** does not use a video cable. Instead, it wirelessly transmits the video signal to a wireless receiver that is connected to your recording or viewing device. Although the typical digital wireless camera is priced slightly higher than a wired camera, wireless cameras can provide cost savings compared to standard wired setups. For example, wireless cameras do not require cabling to be run between the camera and the viewing / recording device, which reduces installation time and cost.

9.2 Does a wireless camera require power?

Yes. Wireless cameras require two power sources: one connected to the camera, and the other to the receiver.

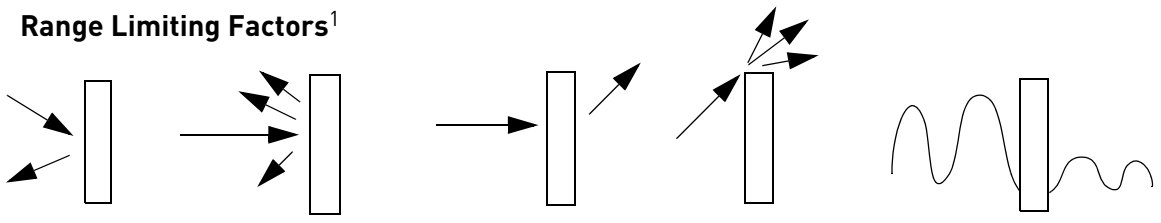
9.3 How far can a wireless camera transmit a video signal?

In an open field (with line of sight), a typical wireless camera has a range between 250 to 500 feet. In a closed environment—such as an interior of a house—the wireless camera range is between 100 to 165 feet. The signal range varies depending on the type of building materials and/or objects the wireless signal must pass through.

Cubical walls, drywall, glass, and windows generally do not degrade wireless signal strength. Brick, concrete floors, and walls degrade signal strength[1]. Trees that are in the line of sight of the wireless camera and receiver may impact signal strength.

The signal range also depends on whether there are competing signals using the same frequency as the camera. For example, signals from cordless phones or routers may affect signal strength.

Range Limiting Factors[1]



Reflection	Scattering	Refraction	Diffraction	Attenuation
The signal reflects back	The signal scatters back into multiple new signals	The signal bends as it travels through an object (e.g. glass window)	The signal changes direction as it passes around an object	The signal strength weakens as it passes through an object

[1]**Source:** Xirrus (2010). "Wi-Fi Range Dynamics".
Retrieved online at http://xirrus.gcsmarket.com/pdfs/Xirrus_Wi-Fi_Range.pdf

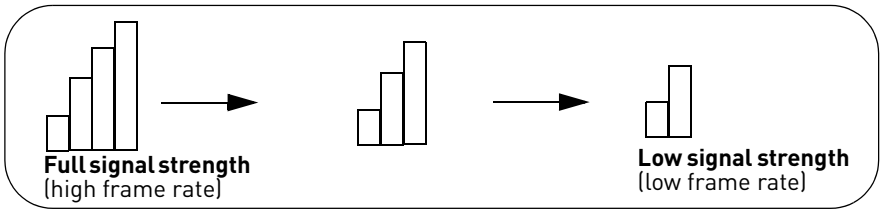
Signal Reduction Through Materials

Signal strength decreases as it passes through different types of material. Try to position your wireless camera and receiver in a location where the signal does not pass through metal or concrete blocks, which can significantly reduce signal strength (as shown in the table below).

Material	Signal Reduction (%)
Plaster & Wood	10 - 30%
Brick	30 - 50%
Concrete Cinder Blocks	50 - 70%
Metal & Metal Cladding	70 - 90%

NOTE: Signals that must pass through wet or moist materials (e.g. shrubs and trees) may be significantly reduced.

The stronger the signal strength, the higher the video frame rate. The lower the signal strength, the lower the video frame rate.



9.4 Are digital wireless camera signals secure?

Yes. Lorex digital wireless products feature a wireless transmission method called FHSS—Frequency Hopping Spread Spectrum.

This type of signal is highly resistant to eavesdropping as it generates a channel hopping sequence using an algorithm generated by the receiver, which only the camera can follow through the "pairing" function. FHSS makes digital wireless signals secure, private, and interference free.

9.5 How many frames per second should I expect from a digital wireless camera?

Current Lorex digital wireless cameras offer 10 - 30 FPS (Frames Per Second) performance. Actual frame rate depends mainly on signal strength and resolution (see the chart above).

For details on supported resolutions and frame rates for this model, see “Appendix A: System Specifications” on page 8.

9.6 How many wireless cameras can I install?

It is recommended to install a maximum of 4 (four) wireless cameras per system. It is also recommended to leave as much space as possible between receivers to minimize potential signal strength degradation.

10. Appendix D: Troubleshooting

If you have problems with your system, there is often a quick and simple solution. Please try the following:

Problem	Solution
There is no picture from the camera	• Make sure that the camera is plugged into a power outlet and that the power adapter is plugged in properly. • Move the camera closer to the receiver.
There is no audio from the camera or there are problems with the audio	• Make sure that the white audio connector on the receiver is connected to the correct audio input on your TV/DVR/VCR. • Make sure that your DVR/VCR is connected to speakers. • Make sure that the volume is turned on. • Make sure that there is sound within range of the camera microphone. • If the unit emits a loud screeching noise (feedback), move the camera and receiver farther apart.
The picture is dropping	• Move the camera closer to the receiver. • Try repositioning the camera, receiver, or both to improve the reception.
The picture is or has become choppy	• The picture may become choppy when experiencing a lower frame rate (e.g. 6 frames per second vs. a higher 20 frames per second). • Try moving the camera closer to the receiver. • Remove obstructions between the receiver and camera.
The picture is white	• "Washout" or "white wash" can occur when a strong light source is pointed at the camera lens. The camera lens is not harmed during a white wash. • Do not point your camera towards a bright light source.
The picture is too dark	• If using during the day, the camera may not be getting enough light. Slide the sunshade backwards to let in more light.
The picture is too bright	• If using during the day, the camera may be getting too much light. Slide the sunshade forwards to let in more light.
Night vision is not working	• Night vision activates when light levels drop. The area may have too much light.
Bright spot in video when viewing camera at night	• Night vision reflects when pointing a camera at a window. Move the camera to a different location.

11. Appendix E: Frequently Asked Questions

Q: What is the maximum distance I can have between the camera and the receiver?

A: Typically 500 feet (152m) with a clear line of sight in open space, or approximately 165 feet (50m) in a house. Walls, studs, and furniture will interfere with the range of wireless transmission.

Q: Why does my "wireless camera" have a power cable?

A: The term "wireless" refers to the lack of a video cable between the camera and the receiver. The camera still requires a power source.

Q: What does 'line-of-sight' mean?

A: 'Line-of-sight' means that there are no obstructions between the camera and receiver. Obstructions include walls, buildings, trees, and certain electronic devices. Materials containing moisture (for example, wet leaves) may also act as an obstruction.

Q: What is pairing?

A: Pairing is an electronic handshake between digital wireless devices. Pairing allows the devices to communicate exclusively with each other.

Q: Can digital wireless cameras be paired to more than one receiver?

A: No. Digital wireless cameras can only be paired to one receiver. This is to prevent interception by 3rd parties, and prevents any other device from picking up the signal—this also means that you cannot pair one camera to multiple receivers.

Q: How can I extend the wireless range?

A: For details, see “Appendix F: Extending Wireless Signal Range” on page 14.

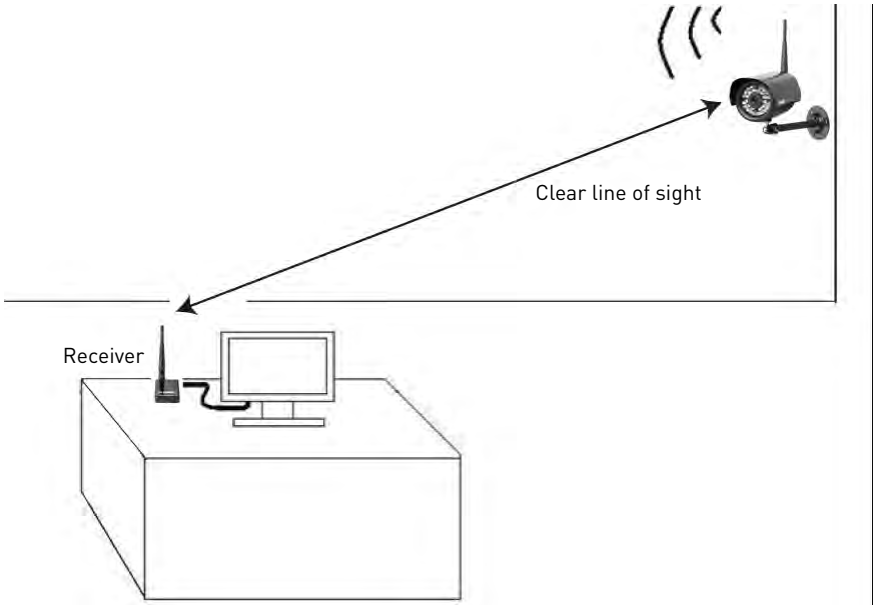
12. Appendix F: Extending Wireless Signal Range

DISCLAIMER: Certain accessories are not available in all markets.

There are several ways to boost your wireless signal as well as options to help you extend the range of the wireless signal.

Clear Line-of-Sight

The digital wireless signal is virtually interference free. However, you should always ensure there is a clear line-of-sight between the camera and the receiver.



Obstacles

There should be little to no obstacles obstructing the line-of-sight between the camera and the receiver. Solid objects, such as concrete and metal, may limit the range of the wireless signal.

Extending Your Wireless Signal

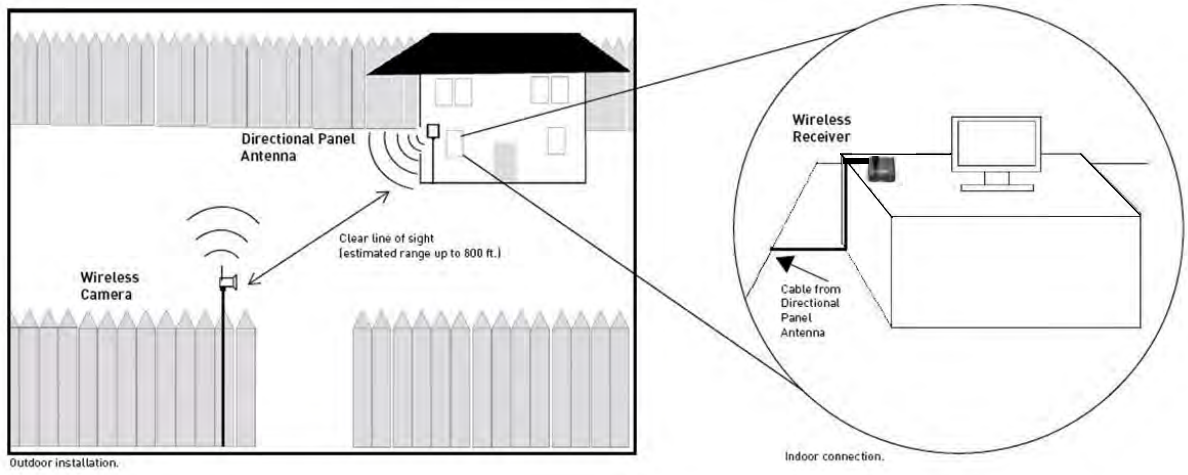
Even with a clear line-of-sight between your camera(s) and your receiver(s), you may experience a lower video frame rate simply due to the distance between your wireless devices.

Accessory antennas are available that can help extend the range of your wireless signal.

2.4 GHZ Directional Wireless Panel Antenna

Use the 2.4GHz Directional Wireless Panel Antenna (model #: **ACCANTD9**) to focus a wireless signal onto one specific camera in order to increase the range of transmission (clear line-of-sight between the camera and the antenna is required). A 20ft extension cable is included to help to properly position the antenna.

Directional Wireless Panel Antenna



Scenario 1: Single Camera / Receiver Installation

If you are using only one wireless camera and receiver in your installation, you may attach a directional antenna to either the camera, receiver, or both. It is recommended to attach the antenna to the receiver and place it in a location that has clear line-of-sight to the camera. During the installation, check the reception on your TV, DVR, or observation system.

Scenario 2: Multiple Camera / Receiver Installation

If you are using multiple wireless cameras and receivers in your installation, attach directional antennas to the camera(s) and receiver(s) that are farthest away from each other. Follow these guidelines to increase the signal strength between your cameras and receivers:

- Point directional antennas towards the receiver for each camera.
- Keep as much space as possible between each receiver.
- Keep as much space as possible between directional antennas if using more than one.
- Minimize the amount of obstructions (e.g. walls or trees) between the antennas and receivers.
- During the installation, check the reception of each camera on your TV, DVR, or observation system.

Visit www.lorextechnology.com for more details on wireless antennas and accessories.

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